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The Value of the Whole-Blood Phagocytosis Test as a means of determining reactivity to Brucella Infection in Cattle

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A problem of major importance in the control of contagious abortion and one which has taxed the ingenuity of many workers, is that of distinguishing between susceptible, infected and resistant animals. It cannot yet be claimed with any confidence that this has been achieved. The agglutination and other serological tests, if positive, provide the information that an animal has at some time received an antigenic stimulus, but by no means all serologically positive animals are infected; and conversely some serologically negative animals are infected. The various allergic tests which have been introduced from time to time have likewise not been very successful as a means of differentiation.

In 1933 Huddleson and his colleagues (Huddleson, Johnson and Hamann, 1933) published the results of experiments designed to test the phagocytic activity for *Br. abortus* of the blood of various groups of humans. Briefly, their method was to mix equal volumes of a suspension of *Br. abortus* and citrated whole blood, incubate for 30 minutes at 37° C. and examine smears suitably stained for polymorphonuclear cells showing phagocytosis of the test organism. This test was performed in conjunction with an allergic skin test, and by means of the two, Huddleson claimed to be able to distinguish between susceptible, infected and resistant humans. He showed, among other things, that the blood of infected and uninfected susceptible persons had a low phagocytic activity against *Br. abortus* and that the blood of resistant persons and of those recovered from an attack of undulant fever had a high phagocytic activity.

Huddleson adopted the term "opsonocytophagic" for this phagocytic power of blood. The term was first introduced by Glynn and Cox (1909-10) to distinguish the whole-blood test from the opsonic test of Wright and Douglas (1903-4) in which serum and separate leucocytes are used. It seems, however, an unnecessarily cumbersome term; the term "whole-blood" is preferable, being simpler and more explanatory.

Huddleson's results on humans were confirmed by K. F. Meyer, Stewart, Veazie and Eddie (1934-35) on over 700 blood samples, although Veazie and K. F. Meyer (1934-35) pointed out that there are many sources of technical error; they note that an increase in the incubation period, partial clotting of the blood, a trace of acid in the tubes, alteration of the *p*H of the reagents, etc., all affect the phagocytosis and further they state that "blood taken from the same person on different days, though the conditions of the test were as nearly identical as possible, gave widely differing results."

Later Huddleson (1935, 1936a, b., Huddleson Johnson and D. B. Meyer, 1936, Meyer and Huddleson, 1936) introduced a similar whole-blood phagocytosis test for the differentiation of susceptible and resistant cattle. It is impossible adequately to assess the evidence on which Huddleson's opinions are based since, although considerable numbers of animals are said to have been examined, relevant figures are given for only two (*see* Huddleson, Johnson and Meyer, 1936). It must be admitted that the evidence is very meagre. In the one publication where figures are given it is reported that eight cattle were obtained, four of which had a low phagocytic activity for *Br. abortus* and were consequently vaccinated by instilling a heavy suspension of a live avirulent culture into the vagina, and four of which had a high phagocytic activity and were untreated. All animals were negative to the agglutination test at the commencement of the experiment. The phagocytic activity of the vaccinated group rose rapidly after vaccination. Subsequently, an attempt was made to infect the eight animals by placing several drops of a heavy suspension of a recently isolated culture of *Br. abortus* into the conjunctival sac of one eye. None of the animals became infected, and Huddleson concludes, therefore, that phagocytic activity is of prime importance in immunity to contagious abortion. Unfortunately, he apparently overlooked the inclusion of a control group in his experiment, so that there is, therefore, no

evidence that his infecting dose was in fact an infective one. Huddleson even goes so far as to claim that not only can immune and susceptible animals be differentiated by this means but that the degree and duration of immunity can be estimated. Without data it is impossible to criticise this argument but it appears to be a *post hoc ergo propter hoc* one.

Among other things Huddleson and his colleagues conclude that their studies may seriously invalidate previous conclusions as to the value of vaccination since they believe that vaccinated animals shown to be resistant to *Br. abortus* infection may be so in virtue of possessing a high phagocytic activity before vaccination. It seems clear that the authors have not studied the statistical implications of this statement very seriously. Clearly, if vaccination experiments are carried out on a reasonable numerical scale and follow the general principles of random sampling, it follows that control non-vaccinated groups are initially as likely to contain animals with a high phagocytic activity as the vaccinated groups. If a difference exists, therefore, between the two groups it cannot be ascribed to initial differences in the phagocytic activity. If the number of animals in an experiment is so small that it is statistically reasonable to conclude that one group may possess significantly more animals with a high phagocytic activity than another, then the experiment is probably valueless in any case.

The only other contribution to this problem, in the better known journals, is by Delez (1937), in which he states that "the study of the phagocytic power of blood in an opsonocytophagic system offers a possibility of evaluating more accurately the relative merits of various procedures to develop resistance against Brucella infection." His figures, however, do not seem to support this conclusion since there was little difference in the phagocytic activity of his control and vaccinated groups and a distinct difference in their susceptibility to *Br. abortus* infection.

The importance and far-reaching effects of Huddleson's claims, if the technique proved simple and accurate, seemed to justify an attempt to confirm his results on a comparatively large scale. Accordingly, some 278 cows were bled and examined by a procedure essentially similar to that outlined by Huddleson, Johnson and Meyer (1936).

Technique

The 278 animals examined were dsitributed over seven farms where vaccination experiments were in progress. The vaccine in use consisted of a living suspension of an aerobic avirulent strain of *Br. abortus* which was smooth as judged by the heat-stability and agglutination tests outlined by Pandit and Wilson (1932); this vaccine has previously been shown to be effective in preventing *Br. abortus* infection in guinea-pigs (McEwen and Roberts, 1936) and is administered subcutaneously. With one exception, the seven farms contained vaccinated and non-vaccinated animals running together, the vaccination having been carried out on animals negative to the agglutination test but otherwise selected at random.

Just prior to bleeding 0·4 c.c. citrate solution was placed in tubes marked with a white-paint ring at a point representing a volume of 5·4 c.c. The cows were bled from the jugular vein, the blood being allowed to flow until 5·0 c.c. had been collected.

The citrate solution was exactly that described by Huddleson, namely, 12·5 per cent. sodium citrate in 4·25 per cent. sodium chloride solution. Huddleson has stressed the importance of keeping the citrate solution constant, pointing out that slight variations in the concentration cause conflicting results. Special care was, therefore, taken on this point.

The antigen was prepared from a virulent and CO_2 sensitive strain of the bovine type of *Br. abortus*. Huddleson has stated that any of the three species may be used and that it is immaterial, at least for human bloods, whether a virulent or avirulent strain is used, although later Munger, Huddleson and Wakeman (1937) stated that only heat-stable strains should be used. For this work it was considered advisable to use a virulent strain, since this is the type of organism that phagocytes would be most likely to encounter under natural conditions. Suspension was prepared from 48-hour liver agar cultures and standardised by opacity to tube No. 5 of the Brown scale. The suspending fluid consisted of distilled water containing 0·6 per cent. sodium chloride and 0·5 per cent. barium chloride.

For the actual test, the examination of smears and the recording of results, some slight variations from Huddleson's technique were introduced. It may be seen that these were such as could have had no effect on the ultimate conclusions.

Instead of using 0·1 c.c. volumes of citrated blood and bacterial suspension 0·5 c.c. volumes were used; this amount was chosen because it was a more convenient one with which to work. The mixture was incubated at 37° C. for 30 minutes, being shaken once or twice during that period and again at the end. Smears were made from each mixture by spreading one small drop on a slide in the usual way with another slide. The smears were air dried, fixed with methyl alcohol and stained with Giemsa's stain.

Huddleson and his colleagues examined 25 intact polymorphonuclear leucocytes in each smear, dividing the phagocytosis into four categories according to the approximate number

of bacteria the cells had phagocytosed. These categories were: *negative* when no phagocytosis occurred, *slight* when 1 to 20 organisms were taken up, *moderate* when 21 to 40 organisms were taken up, and *marked* when the number was over 40. As Huddleson has pointed out, for routine purposes it would be difficult to count the number of bacteria in each cell owing to the small size of *Br. abortus* and to the enormous numbers that are sometimes to be found within a single polymorphonuclear leucocyte. Statistical considerations necessitated a deviation from Huddleson's method of classification, and it was decided to divide the cells into two categories only, namely, those showing definite phagocytosis of about ten or more Brucella organisms and those showing little or no phagocytosis. In addition, it was decided, after a preliminary trial, to examine 50 cells instead of 25. The error in a count of 25 is very large. There is frequently a notable difference between two counts made on different sections of the same slide; this may not be marked in smears in which either most of the polymorphonuclear cells or very few of them show phagocytosis, but it is quite definite in the intermediate groups.

The results of an experiment devised to estimate this error are shown in Table I.

Table I

Showing the differences in duplicate counts on different sections of the same smears.

Sample.	First Count.	Second Count.	Percentage Difference. (Larger—Smaller.)
1	10	15	33·33
2	7	2	71·43
3	11	4	63·64
4	4	8	50·00
5	13	10	23·08
6	5	4	20·00
7	8	13	38·46
8	11	6	45·45
9	2	3	33·33
10	11	11	0

Mean percentage difference = 37·87.
Standard deviation ... = 21·10.
X^2 ... ... = 11·741.
N ... ... = 10.
P ... ... = Approximately 0·30.

Table II

Showing the number of calves, the agglutinin content and the degree of phagocytosis in *non-vaccinated* animals.

No. of Calves.	Agglutinin Content of Serum (expressed in Titre).																					
	0				1 : 10		1 : 20		1 : 40		1 : 80		1 : 160		1 : 320		1 : 640 or higher.	
0	6				39	2												
1	1	33	0	0	11		20				4							
	13	16	3	7														
	30	4	14															
	0	1	3															
	24	2	8															
2	2	31	2		15				35		0		8		39		4	
	0	18	0		4				5		2		16		17			
	29	8	14								4		0		17			
	39	1																
	13	9																
3	23	21	20		0		14		0		11		3		27		9	
	33	17					49		17		23		1		6			
	7	9							18		10		2					
	14	0							2		0							
4	18	30			13		40	7	10		6		10		12	30	3	
	9	26			23		11	7			10		0		12	0	4	
	1	15			24		1	36			12		4		22	30	2	
	16	35					4						5		13			
	17	17																
5	44	8	15	6	3	42	22	14	22		2		4		10		40	
	2	6	36	18	1		0						44				4	
	24	20	20	9	1		1											
	5	38	28		13		4											
6	0	29	12		5		2	17	18		5		1				23	10
or	14	16	17		0		3	10	5		0						3	
more	3	20	18		6		11		1								1	
	32	14	20				11										0	
	14	6	13															

The figures within the table represent the number of polymorphonuclear cells, out of 50 counted, showing definite phacogytosis of *Br. abortus*.

Duplicate counts were made on ten smears selected at random, 25 polymorphonuclear leucocytes being examined on each occasion. It may be seen that the mean percentage variation is 38 with a standard deviation of 21. If we multiply the standard deviation by two, the minimum necessary to cover chance fluctuations, it may be seen that the variation on a recount may be approximately 0 or as much as 80 per cent. of the larger count. It is to be noted that a χ^2 test carried out on these figures shows that they do not vary by more than might reasonably be expected by chance.

If, therefore, such wide fluctuations can occur by chance it seemed altogether improbable that individual animals could be classified by this test, and it was likely that only group differences would be shown. As will be seen later the results amply justified this conclusion. Now while it is realised that to double the accuracy of a mean value the number of observations should be multiplied by four (since the error decreases, not in direct proportion to, but as the square root of the number of observations), nevertheless, it was considered that 50 cells was sufficient for the purposes of this work, and that 100 was altogether too laborious as a routine procedure.

The history of each cow tested was known, the relevant data including (*a*) whether vaccinated or not (*b*) the number of calves produced—this provided a rough indication of age, and (*c*) the antibody titre of the serum as judged by the agglutination test. This latter test was performed on samples of serum collected at the same time as blood for the phagocytosis test, and was carried out by the routine method adopted by the committee on Brucelloses of the Agricultural Research Council of this country; briefly this test consists in mixing dilutions of serum ranging from 1 in 5 to 1 in 320 with equal volumes of suspension and incubating at 37° C. for 18 to 24 hours; the suspension is standardised to have a constant agglutinability and has an opacity approximately equivalent to tube No. 4 of the Brown scale.

Results

The results are recorded in Tables II and III. The figures within the tables represent the number of polymorphonuclear leucocytes, out of 50 counted, which showed definite phagocytosis. To the eye there is no immediately apparent difference between the vaccinated and non-vaccinated sets; it was clearly necessary to apply statistical methods to elicit any points of value.

Table III

Showing the number of calves, the agglutinin content and the degree of phagocytosis in the *vaccinated* animals.

No. of Calves.	Agglutinin Content of Serum (expressed in Titre).							
	0	1 : 10	1 : 20	1 : 40	1 : 80	1 : 160	1 : 320	1 : 640 and higher.
0			5					
1	5	6	29				10	
	5		12				0	
			13					
			6					
2	2		6	0	3			
				2	8			
3	0	2	5	9	2	1	0	2 0
	14	5	11	1	5			16 10
	0		13					
4	13	2	26 6	0	0	31	3	
	22	6	0 14	13		7	3	
	11	17	2 1	4		2	1	
		9	3 34	48				
5		13	16	7	16	5	25	2
		13	22	0			22	40
			0	7				8
			3	8				
6	10 0	4 6	1	0		8		
or	11 1	18 11	4	3		10		
more	7	21	9					
	5	25	4					

The figures within the table represent the number of polymorphonuclear cells, out of 50 counted, showing definite phagocytosis of *Br. abortus*.

Table IV

Showing the results of the Analysis of Variance test to determine the effect of age.

	Degrees of Freedom.	Mean Square.	Observed Z.	5 per cent. Points.	Type of Animal.
Between classes	4	184·075	0·1386	0·4486	Non-vaccinated. Titre 0 to 1 : 20.
Within „	113	139·502			
Between „	4	162·755	0·1575	0·4643	Non-vaccinated. Titre 1 : 40 to 1 : 640 +
Within „	58	118·784			
Between „	4	38·770	0·2720	0·8701	Vaccinated. Titre 0 to 1 : 20.
Within „	50	66·793			
Between „	4	137·105	0·0907	0·4827	Vaccinated. Titre 1 : 40 to 1 : 640 +
Within „	37	114·370			

It seemed that the important questions to ask were whether there was any relation between phagocytosis and (*a*) number of calves produced, *i.e.*, age (*b*) antibody titre of serum, and (*c*) vaccination, the last being the fundamental question.

To determine the effects of age and titre it was decided to apply the method known as *Analysis of Variance* outlined in the books by Fisher (1932, 1936). Briefly, this method consists of showing whether the variation *between groups* of observations is significantly greater than that *within groups*. Clearly if the variation within groups is very high there is not likely to be a very significant difference between groups, and consequently little relation between the two factors under test, unless the variation between groups is also high.

Table IV shows the results of the analysis of variance test carried out to determine the effect of age. The observations were grouped into low (0 to 1 in 20) and high (1 in 40 to 1 in 640+) titres, and into age groups of 0 to 2, 3, 4, 5 and 6, or more calves. The heavy lines in Tables II and III indicate the groupings. To make this point quite clear it may be seen, for example, that among the non-vaccinated animals in the " high-titre, six or more calves " group there are eleven observations with the following values: 18, 5, 1, 5, 0, 1, 23, 3, 1, 0 and 10. It may be noted that the observed values for Z are well below the 5·0 per cent. points of the distribution of Z according to Fisher's table. In other words, it seems that age has little or no effect on phagocytosis as determined by the method described here.

Since age had no effect it was possible to group the observations more narrowly into separate titres starting at 0 and reaching 1 in 640+ (*i.e.*, 1 in 640 or more). Analysis of variance was likewise carried out on these figures with the results recorded in Table V.

It may be seen that the observed value of Z approaches the 5·0 per cent. point in the non-vaccinated group; in other words, titre is probably related to some extent to the degree of phagocytosis. Regression lines have not been calculated, but it seems evident from the graphical representation in Fig. 1 (*overleaf*) that the relation is not linear.

In view of this finding it was decided not to combine all titres and compare the mean values of all vaccinated and all non-vaccinated animals. Instead each pair of means at similar titres were compared in the usual way, *i.e.*, by finding whether the difference was at least twice as

Table V

Showing the results of the Analysis of Variance test to determine the effect of agglutinin titre.

	Degrees of Freedom.	Mean Square.	Observed Z.	5 per cent. Points.	Type of Animal.
Between classes	7	258·513	0·3379	0·3620	Non-vaccinated.
Within „	173	131·519			
Between „	7	36·161	0·4584	0·5940	Vaccinated.
Within „	89	90·456			

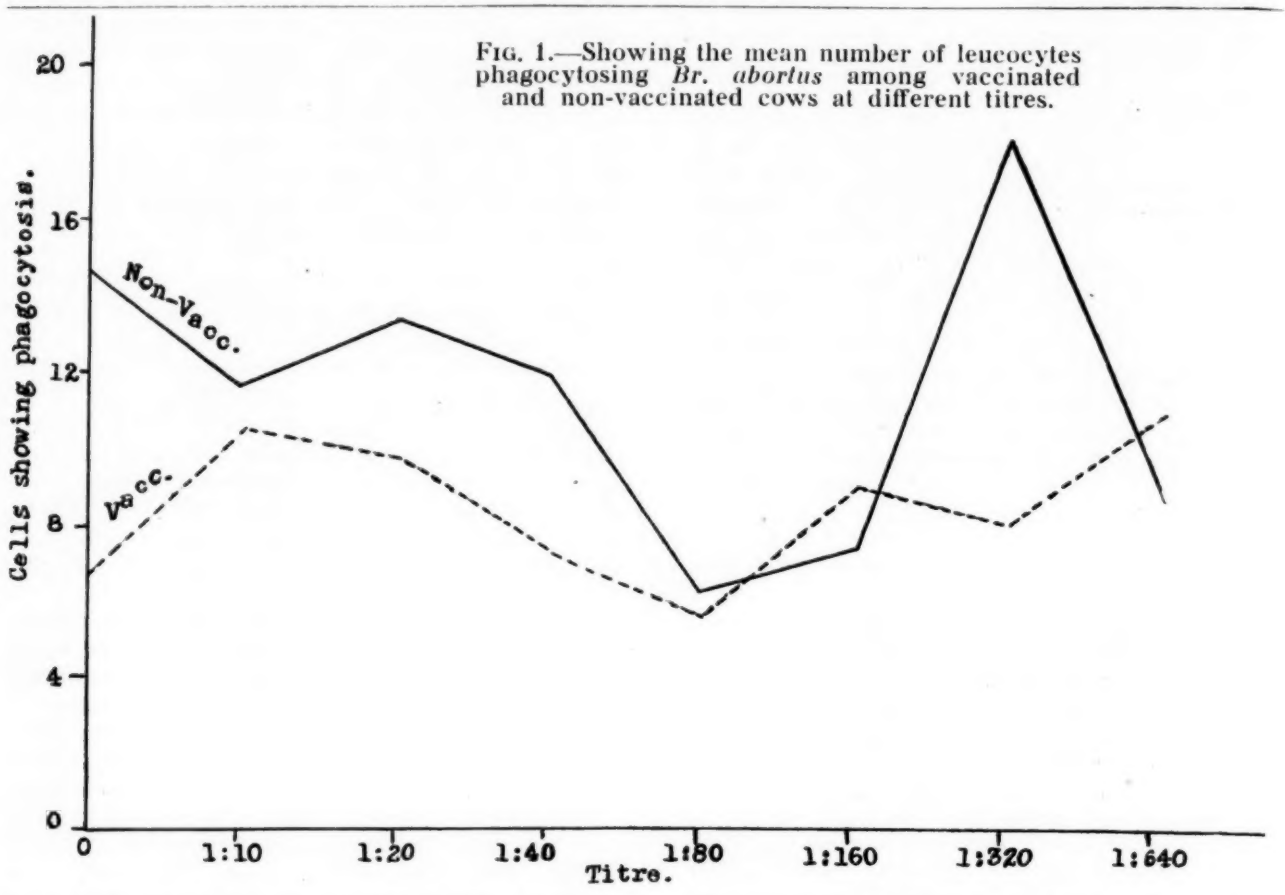

FIG. 1.—Showing the mean number of leucocytes phagocytosing *Br. abortus* among vaccinated and non-vaccinated cows at different titres.

big as its standard error. The figures shown in Table VI show that in only two cases is this difference significant.

TABLE VI

Showing the difference between the comparable mean values at various agglutinin titres.

Titre.	Mean Values.	Difference (N.V.-V.)	Standard Error.	Ratio D/SE.
0	N.V. 14·58 V. 7·07	7·51	2·073	3·6
1 : 10	N.V. 11·88 V. 10·53	1·35	3·683	0·4
1 : 20	N.V. 13·52 V. 9·8	3·72	3·486	1·1
1 : 40	N.V. 12·09 V. 7·29	4·80	4·674	1·0
1 : 80	N.V. 6·36 V. 5·67	0·69	2·901	0·2
1 : 160	N.V. 7·54 V. 9·14	—1·6	5·056	0·3
1 : 320	N.V. 18·08 V. 8·00	10·08	4·703	2·1
1 : 640	N.V. 8·58 V. 11·14	—2·56	8·240	0·4

N.V. = Non-vaccinated.
V. = Vaccinated.

The graph of Fig. 1, however, clearly suggested that the mean values of the non-vaccinated animals are higher, and if a general error could be estimated which obviated the error due to differences in titre, it was thought that possibly the general means would be significantly different. The failure of the previous test would then be due to insufficient observations in the individual groups. Now if we make the reasonable assumption that the error within groups is random and similar in all groups, the error of the general mean will be a mean value of the " within groups " errors. The test for significance then becomes as follows:—

Vaccinated = 8·77 ± $\sqrt{131{\cdot}519/181}$
Non-vaccinated = 12·76 ± $\sqrt{90{\cdot}456/97}$
Difference = 3·99
Standard error of difference = 1·288
Ratio D/S.E. = 3·1

The difference is, therefore, significant and we may conclude that, in this series, the non-vaccinated animals phagocytosed *Br. abortus* more readily than did the vaccinated.

Discussion

In the light of these results the claims of Huddleson and his colleagues seem a little surprising. There seems no doubt that, among the 278 animals examined in this laboratory, the

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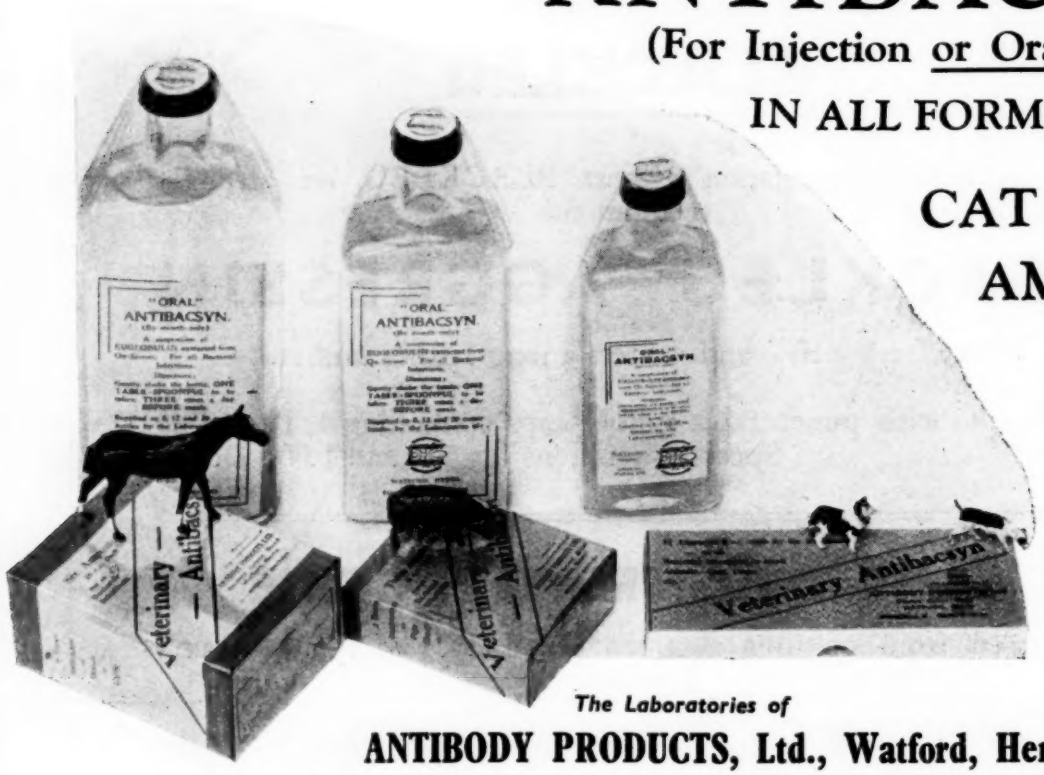

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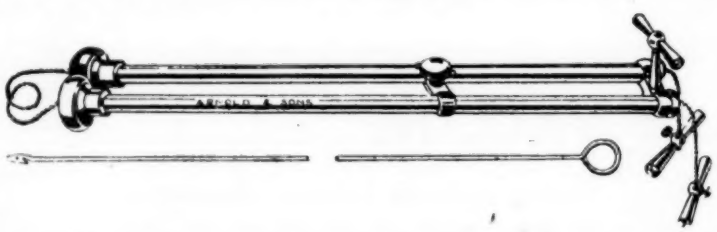

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non-vaccinated had a higher phagocytic activity than the vaccinated—the converse of what Huddleson states is the case. In view of the fact that statistical demands for significance are satisfied, it is unlikely that the result would be altered by the examination of a larger series of animals.

The field vaccination trials have not been in progress long enough to assert with any confidence that the vaccine is beneficial; but neither does the evidence so far available suggest that the vaccine is harmful. It is quite obviously conceivable that the vaccine is having no beneficial effect, but the converse is *a priori* quite improbable, perhaps especially so when it is remembered that it has been shown to be effective in guinea-pigs.

One fact emerges from these figures which appears to lend support to Huddleson's claims. It is an entirely reasonable assumption that, in the non-vaccinated group, there is a greater incidence of infection with *Br. abortus* among those animals with a high antibody titre than among those with a low titre. It is needless to quote the evidence in the literature on this point; the fact is quite established. Now it may be noted that the mean number of cells phagocytosing *Br. abortus* is greater among the animals with a low titre than among those with a high titre, and the difference is formally significant, being 2·03 times its standard error. If it could be shown that the animals with a low titre are in fact more resistant, and that the difference is not dependent on other causes such as exposure time, then the fact that these animals have a higher phagocytic power might be regarded as evidence in favour of Huddleson's claims. It would seem unlikely that the difference is due to exposure time since the mean number of calves produced by the low titre animals (3·68) is not significantly less than the number produced by the high titre animals (3·81). However, if a χ^2 test is carried out on the frequencies relating age to titre, it will be found that the observed distribution is not in accord with the hypothesis of independence. This observation is probably sufficient to account for the difference in infection rate between high and low titre animals.

Finally, whether Huddleson's general views are ultimately shown to be correct or not, these results show that while group differences may be demonstrated individual ones are likely to be very misleading. This is demonstrated in two ways; firstly by the differences observed in different sections of the same smear and secondly by the fact that, in the cases tested by Analysis of Variance, the variances within groups are large.

At this stage it would perhaps be unwise to emphasise the difference in the phagocytic activity between vaccinated and non-vaccinated animals, but the results certainly do not support Huddleson's claim that vaccination raises the phagocytic power.

Summary

Two hundred and seventy-eight animals have been examined for the so-called opsonocytophagic power of their blood towards *Br. abortus*. These included vaccinated and non-vaccinated animals of varying ages and with varying agglutinin titres.

It is shown that counts on the same smear of the polymorphonuclear leucocytes showing phagocytosis of *Br. abortus* may vary by as much as 80 per cent.

Further, among this series it is shown that (*a*) age is an unimportant complicating factor, (*b*) the degree of phagocytosis in the non-vaccinated animals is related to titre, probably in a non-linear fashion, being greater on the whole in low titre than in high titre animals and (*c*) non-vaccinated animals show a higher phagocytic activity than do vaccinated animals.

It is not desired to emphasise this last point as yet, but at least it may be said that the evidence presented here does not support the claims made by Huddleson that phagocytosis of *Br. abortus* by polymorphonuclear leucocytes may be used as a means of detecting susceptible and resistant animals.

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I wish to record my thanks to Dr. J. O. Irwin for much help with the statistical problems.

Moon Blindness (Periodic Ophthalmia)

A Preliminary Report*

About a year ago the Horse and Mule Association of America initiated an investigation into moon blindness. Early investigations showed that the disease was widespread in America and public and private donations amounting to 41,000 dollars enabled a research programme to be undertaken at the Kentucky Experimental Station.

Dr. Herbert C. Clark, of the Gorgas Memorial Laboratory, has issued a report of his preliminary study, a copy of which we have received from the above Association.

The report deals mostly with a consideration of previous investigations and personal impressions of the writer gained by visiting areas in which the condition is prevalent. The following is a summary of the various sections.

1. *Period of Investigation.*—Dr. Clark spent part of April and most of May of this year on thoroughbred farms, especially in Virginia and Kentucky, making a study of the disease and formulating plans for the carrying out of investigations.

2. *Definition.*—The 1923 Horse Book from the United States Department of Agriculture is quoted as stating: "It is an inflammatory affection of the interior of the eye showing a strong tendency to recur again and again and usually ending in blindness from cataract." Dr. Clark's observations indicate that the anterior structures of the eye are first involved but after several attacks panophthalmia and atrophy occur.

3. *History.*—Various old theories of its causation are mentioned, *e.g.* connected with some mysterious change in the moon, heredity, etc. It is now realised that the disease is world wide, has been known for centuries and is peculiar to equines.

4. *Geographical Distribution.*—It is impossible to make definite statements because the disease is not reportable, but it seems to be prevalent in most of the States of America with the lowest incidence in the region west of the Rocky Mountains and the highest in the upper half of the Mississippi Valley. It is stated that 14 per cent. of the Army animals in South Africa, during the South African war, were affected but that the disease has not been found in South Africa for the past 30 years.

5. *Cause or Causes.* — The literature is reviewed.

(*a*) Bacterial agent—reference is made to the coccobacillus described by Dor (1900), Dalling (1917) and Bonazza and Merillat (1922), to *Staphylococcus aureus* described by Eyre (1911) and the *Flavobacterium ophthalmiae* recovered by Rosenow (1927).

(*b*) Food deficiency, avitaminosis. Vitamin A deficiency is believed to be the cause by observers in Europe and America.

(*c*) Virus disease. The author states that Woods and Chesney (1930) undoubtedly proved that at least one epidemic near Baltimore was produced by a filterable agent. They passed the agent through six generations in rabbits and then produced the disease in a horse.

(*d*) Parasitological agents. References are made to the protozoon-like body reported by Fox and Langdon (1911), and to the view of Tischenko (1934) who attributed the occurrence of the disease among 73 horses to the presence of *Parafilaria multipapillosa* in the skin. He considers that the parasites might invade the vessels of the eye though there is no record of the presence of the worms in the tissues or cavities of the eye.

(*e*) Allergic condition. Various articles are quoted. Manninger (1930) showed that a horse's own protein, when decomposed, has toxic properties and may cause autointoxication resulting in blindness. Gmelin (1936) thinks that horses being incapable of disposing safely of accumulations of a foreign protein, due to the inadequate state of the reticulo-endothelial apparatus, suffer from an allergic state referred to as hyperergasia. The origin of the condition in horses is from intestinal helminths, chiefly ascarids and strongylids. The ascarids excrete a toxin which enters the circulatory system through wounds, etc., caused by the strongylids. The reticulo-endothelial mechanism finally breaks down and changes in the eyes result. He suggests that the control of intestinal parasites is the best prophylactic. Schaper (1937) holds the same view as Gmelin but goes further and thinks that there may be an inherited disposition towards allergies. Dr. Clark feels that the relationship of hereditary disposition towards periodic ophthalmia cannot be fully supported because of the large number of foals which never develop the disease though the mares and stallions from which they were bred were affected.

**From*: Herbert C. Clark, Director, Gorgas Memorial Laboratory.
To: Cary T. Grayson, Chairman, Gorgas Memorial Institute.
The report is in the form of a news letter from the Horse and Mule Association of America, 407, Southern Dearborn Street, Chicago, Illinois, dated August 20th, 1937.

6. *Symptoms.*—This section is quoted in full. "The onset is sudden and usually leads the handlers to believe that the animal has bumped its head or received a blow over the eye. The eyelid swells and there is ptosis of the upper lid. Lachrymation and photophobia are marked but there is no discoloration of the tissue suggesting a blow and there is no purulent discharge in an uncomplicated case. There is oedema of the periorbital fold followed by ciliary congestion and sometimes a yellow exudate into the anterior chamber. Acute iritis with delayed or irregular action of the pupil to light is noted. Vitreous opacities may occur early. The iris tends in most cases to establish synechiae and finally the lens is totally obscured and the ophthalmoscope cannot be of assistance in further examinations of the eye ground. The retina and optic nerve seem to be the last regions invaded by the disease. The end-result of a series of recurrences is total blindness and contraction of the eye-ball that gives a sunken appearance in its orbit as compared to an uninjured eye. There may be as many as eight or ten recurrences before the disease runs its course and each attack may average seven to fourteen days in duration. In the intervals between the early attacks the eye may appear normal and an individual unacquainted with the animal will not know that the disease is established. One can usually note an effort on the part of the animal to make up for its deficient vision by its tendency to hold its ear forward in an effort to make up in hearing what it lacks in vision. As a general rule both eyes are not attacked at the same time. Another vision test for the early stage of the disease is to note the action of an animal when suddenly brought out of a dark stall into daylight. If there are any obstacles near the doorway the animal is apt to crash into if not fall over them. In the early stages the horse is apt to toss its head up and down to gain some degree of relief."

7. *Diagnosis, Clinical and Laboratory.*—There is no laboratory test. The use of the ophthalmoscope in the early stages of the disease allows a study of the state of the iris and the condition of the lens to be made. It is pointed out that several causes may give rise to the early symptoms found in the disease and it is necessary to wait for a recurrence before confirming the diagnosis.

8. *Pathology.*—This section is quoted in full. "This disease appears to attack first the iris and then extends into the ciliary body and choroid. Its first picture is that of an iridocyclitis but in the late stages the entire eye becomes involved. A mononuclear cell infiltration, often with groups suggesting follicular collections of round cells with no germinal centres or sinuses, is seen. Both large and mall mononuclear cells with plasma and epithelioid cells are found and late in the course this infiltration is present in the retina and optic nerve."

9. *Treatment.* — No curative treatment is known. The use of medicaments to dilate and contract the pupil alternately prevents synechia. No serum or vaccine has been found of value.

10. *Prevention.*—Although, in the absence of knowledge of the natural method of transmission of the disease, it is impossible to make definite statements regarding prevention, several general measures are mentioned. These include careful breeding, housing and feeding and intestinal parasite control.

11. *Incidence in Horse and Mule.*—It was found that in most areas the horse shows an incidence of 10 or 12 per cent. compared with 3 per cent. in mules.

12.—*Incidence by Age and Sex.*—No cases were found in sucklings, weanlings, yearlings, two-year-olds and stallions. The great incidence was found in brood mares. The foals from these mares did not have the disease.

13. *Vectors of the Disease.*—The author states that there may not be an animal or insect vector. If forage contamination plays a part birds and rodents may be the vectors. The role of intestinal parasites must also be considered.

14. *Autopsy Observations. — Post - mortem* examinations were carried out on four animals during the survey.

(i) Sixty - day - old thoroughbred foal — eyes normal, multiple suppurative joints and an eroded verminous aneurysm of the mesenteric artery containing larvae of *Strongylus vulgaris.*

(ii) Three-year-old thoroughbred gelding—one eye totally blind, the other almost blind. Two hundred and thirty-eight ascarids found in a limited examination of the small intestine. Large intestine showed heavy infestation of strongylids. Mesenteric artery thick and dilated and contained a few larvae of *S. vulgaris.*

(iii) Eighty-day-old thoroughbred foal—no eye trouble in sire or dam. One eye of the foal was congenitally malformed. Very light worm infestation—few ascarids and strongylids. Few larvae of *S. vulgaris* in mesenteric artery. Some erosion of the intima.

(iv) Three-year-old thoroughbred stallion—blind in right eye for a year and in left eye for four months. Light worm infestation—few bots in stomach, no parasites in small intestine, few strongylids in large intestine. Mesenteric artery thick and dilated—contained four larvae of *S. vulgaris.* Some erosion of the intima.

The author points out that the eroded mesenteric artery lesions are conceivable origins of emboli and that some eye diseases might primarily be due to such emboli.

15. *Seasonal Incidence.*—From Army records (170 cases among 36,594 horses and mules) there

is some evidence that the incidence is greatest in October and lowest in July.

16. *Plans for Research.*—The author considers that financial support should be given to selected institutions already in existence (list given) rather than the establishing of a privately owned laboratory.

17. *Personal Impressions.*—Dr. Clark deals with the following points.

(i) Greater incidence of the disease in farm animals than thoroughbred and standardbred animals.

(ii) Insignificance of the mortality rate, though the existence of the disease may contribute to fatal accidents.

(iii) Unlikelihood of bacteria being the cause. They are probably secondary or accidental invaders.

(iv) Food deficiency is probably only a contributory factor.

(v) He is of opinion that intestinal parasites cannot be considered the cause unless it is shown that they may be vectors or allergic factors.

(vi) He finds it difficult to believe that the virus described by Woods and Chesney is the cause of all moon blindness, giving as his reasons the following :

(*a*) In 39 diagnosed cases practically all started in one eye and it was months or years before the other eye became involved in six cases.

(*b*) Thirty-three of the 39 cases were in brood mares from 4 to 12 years of age. The older the mare and the more foals she had, the greater was the tendency for her to have eye trouble.

(*c*) A disease caused by a virus, bacteria, etc., should involve both eyes at about the same time and thus an ophthalmoscopic examination, in the early stages, should reveal some findings in both eyes. This does not happen. He thinks therefore that the disease is not systemic and that the unilateral incidence indicates a local disease with the conjunctival sac and the nasopharynx through the lachrymal duct as a possible portal of entry. He also thinks that consideration should be given to the vaginal tract as a portal of infection.

(*d*) He could find no pathological description in the literature of the eyelids in affected animals. He suggests that a pathological study should be made of the upper eyelid and lachrymal duct.

(*e*) It is suggested that some study should be made of the contaminations of forage.

(*f*) The association of moon blindness with diseases such as encephalitis, dourine, osteomalacia, age and injury should be studied.

The report ends with a reference to the type of work to be undertaken in the future, *viz.* a careful survey of groups of animals living under different conditions of care and use, investigation into the mode of transmission, experiments with the conjunctival sac and duct as a portal of entry and the use of serum from chronic cases for protective and therapeutic purposes.

The Veterinary Record

October 16th, 1937.

Developments in Veterinary Education

FEW will be prepared to dispute the assertion that at no time in the history of veterinary education in this country has there been a period of greater interest or more active development than that through which we are passing. Many doubtless thought that the recent extension of the curriculum would result in a diminution in the number of those seeking admission to the veterinary schools. The contrary is the case. Within an astonishingly short time conditions have undergone a change that none could have foreseen. A very few years ago every endeavour was being made to convince parents and guardians that the veterinary profession afforded alluring prospects for young men and women seeking to serve the community and live in moderate comfort at the same time. The prospects are still there for the right candidates, but there is now little need to advertise them. For the first time in the history of the veterinary schools of this country it is necessary to restrict the number of those admitted to professional courses of instruction. It is not necessary to try and assess the relative importance of the various factors responsible for the change: it is sufficient to note that there has been a change and that the change is momentous.

Much more important is it to ask if the present prospective entrants to the profession are endowed mentally, physically and in personality in such measure as will fit them to meet the demands of the professional life of the future. But perhaps the question is idle, and it may be doubted if an answer is possible at the present moment, for the demands of professional practice—using the expression in its widest sense—have altered in no little measure of recent years, and there seems great

certainty that change will be even more rapid in the near future. It was in anticipation of future needs that the Council of the Royal College of Veterinary Surgeons decided upon extension and reorganisation of the professional curriculum and an improved minimum standard of general education of those who seek admission to the profession. The veterinary graduate of the future, with his University Degrees and post-graduate Diplomas, ought to be furnished adequately for the performance of the duties that will be imposed upon him provided always that he takes full advantage of the training afforded him and realises that, as a student, he will have to "scorn delights and live laborious days"—in moderation. And sooner or later he will have to decide which particular line of professional activity he proposes to follow, for the day is long past when the young graduate had nothing but general practice in prospect.

COBALT AND SHEEP DISEASES

In a recent issue of *Nature* J. B. E. Patterson states that in New Zealand, Askew and his co-workers have shown that cobalt plays a vital part in the healthy life of sheep and that small supplements of cobalt salts will cure sheep suffering from a type of anaemia. "Sheep on Dartmoor are liable to a disease very similar in symptoms to those described by the New Zealand workers, and the usual practice of farmers is to send their flocks to lowland pastures in the autumn for two or three months.

"Analyses of the cobalt content of the soils from moorland pastures on which sheep suffer and from lowland pastures on which sheep have been known to recover, give striking differences which are statistically significant.

"Moorland soils on which sheep suffer have a mean cobalt content of 3·9 parts per million; lowland soils on which sheep recover, 16·7 parts per million.

"The figure for the sickness soils is higher than that given by Kidson* for corresponding soils in New Zealand, where it was found that sickness was associated with soils having a cobalt content of two parts per million. In the Dartmoor district this figure would be about four parts per million, although occasionally samples have a slightly higher content.

"Analyses of pastures show that those in the sickness areas have a mean content of 0·20 part per million cobalt and those in the recovery areas 0·45 part per million.

"An examination of soil and pasture composition is in progress, and the relationship of these to the incidence of disease is being studied."

*Kidson. (1937.) *N.Z. J. Sci. and Tech.* 18. 694.

ANNOTATION

Retention of the Placenta in Cattle

This is one of the commonest conditions with which country practitioners have to deal; it is also one of the most unpleasant and it is, therefore, no matter for surprise that many and varied are the attempts that have been made to dispense with the usual manual, or rather brachial, intervention that the condition calls for. The German-speaking people appear to have been most actively engaged in investigations to this end during the last 20 years, and indeed, during the last decade new treatments have followed each other rapidly—to be proclaimed for a time and then more or less forgotten.

Dr. E. Liebsch, of the Berlin Veterinary School, has recently made an interesting review of this subject, which he published along with some well-considered observations of his own, which, if correct, call for the casting aside of all kinds of fancy treatment and the retention of a single therapeutic act—"manual removal." So for the general practitioner there is no relief after all, except perhaps to his purse.

The annotator thinks it is correct to state that, in the early decades of the present century, irrigations of the uterus were often, if not commonly used, but in 1918 Oppermann broke new ground by introducing his dry treatment by granulated charcoal (plant or animal), which was supposed to absorb and render innocuous the fluid products of a decomposing placenta, which was first removed. Charcoal used in this way was also said to be deodorant. At the same time Pomayer was advocating most lavish irrigations for the purpose of washing out all scraps of placental débris.

In 1926 a new complex preparation called "Parenchymatol-Hefe-Kohle-Pepsin," containing a general antiseptic-stimulant, yeast, charcoal and pepsin, was introduced by Schellhase. The yeast was supposed to promote fermentation, the pepsin to dissolve and the charcoal to absorb putrid material, under the chairmanship, so to speak, of the parenchymatol. Many other preparations for the same or similar purpose also appeared, *e.g.*, "Perethan" (three tree barks, colloidal silver, silver chloride and hydrogen peroxide), "Silargel" (colloidal silicate and silver protein), "Pep-silicate" (pepsin and silicate), "Polysan" (aluminium hydroxide and an aniline dye), etc. Then again, many more or less simple antiseptics were advocated, such as chinosol, rivanol, entozon, and other dyestuff products, being usable in pessary form or for dissolving in water. Many of these preparation are doubtless still in use.

To complete the picture, reference should be made to ecbolics, which are, in general, of very little value: they include ergot, quinine and pituitary extracts. Benesch and Steinmetzer demonstrated their action on the puerperal bovine uterus in 1931-32 [*See* the *V.R.* (1932.) p. 1363.] They are very active at the puerperal period but become rapidly and progressively inactive during the first week of the post-puerperal period.

With regard to the general management of cases of retained placenta, discussions on this subject in the veterinary press of all countries are numerous. There is a consensus of opinion that the membranes should be removed on the third day *post-partum*, neither sooner nor later, and it is the experience of Liebsch, obtained from a careful study of some 200 cases, that nothing else need be done, that there is no advantage in following up the manual removal by any concomitant uterine irrigation or antiseptic pessary treatment. He holds further that it is not even very important to make sure of removing the placenta *in toto*, as the uterus has great resistance against infection, which might be thought to be a danger at that time. The above opinion is in relation to the future value of the animal for breeding and milk and meat production.

In Part II of his review Liebsch considers the aetiology of retention of the placenta and gives an elaborate classification, which, briefly, is as follows:—

(1) Mechanical causes: obstruction in the genital passage, such as narrow vagina and premature closure of the cervix.

(2) Lack of expulsive power of the uterus, such as follows protracted labour owing to general bodily weakness or to the result of dystokia.

(3) Disorders of the uterine placenta, such as placentitis caused by bacterial infection. It is believed that this is the most important cause and also that *Br. abortus* is the commonest organism involved. This is borne out by Liebsch's observations on 200 cases, of which 1 per cent. was ascribed to cause (1), 18 per cent. to cause (2) and 34 per cent. to cause (3), practically all of the last group being animals infected with *Br. abortus*. The cause of retained placenta in the remaining 47 per cent. of cases was not determined and Liebsch is at a complete loss to account for them. Abortion or parturition in cows infected with *Br. abortus* may be accompanied by slight fever or it may not be and it is uncommon for such cows to suffer any puerperal complication after the membranes have been removed. A condition comparable to puerperal fever in women is not known in cattle.

Liebsch comes to the conclusion that retention of the placenta in cattle is usually of sporadic occurrence and of obscure causation. There can then be no specific treatment based on cause and the only rational therapy is to consider the retained foetal placenta as a foreign body and to treat it on surgical lines, *i.e.*, by removal without more ado and without any unnecessary tinkering.

ABSTRACTS

[**Colic in the Horse.** Gratzl, E. (7 articles.) *Wien. tierärztl. Mschr.* 1936: Vol. 23, pp. 129-138, 257-265, 417-428, 449-457 and 619-624; 1937: Vol. 24, pp. 33-43, 131-138 and 193-203.]

This series of articles deals with all aspects of the problem of colic in the horse and presents the views of the author based on ten years' work at the Veterinary High School in Vienna, as well as observations made on large groups of horses employed by several establishments. It includes a comprehensive review of the literature. Observations were made in the clinic both on living animals and at *post-mortem* examinations.

The main problem was to endeavour to determine whether the group of diseases of the alimentary tract of the horse included under the term "colic" is composed of essentially different entities all of which are similar only in so far as they are accompanied by abdominal pain, or whether there exists some aetiological relationship between them.

The first paper deals with the influence of feeding and management on the incidence of colic and on the tendency to recurrence. Observations were made on nine groups of animals, varying from 936 horses owned by the Vienna garrison and 300 by the police, to groups of 9 and 16 animals owned by two coal merchants. Over 2,000 animals in all are included in the study. In the case of each group, details of feeding, management and veterinary inspection are given, together with the incidence of colic cases. The latter is conveniently expressed as the number of colic cases per 100 animals. This figure varied from eleven in a baking establishment to 88 in a coal merchant's group. The general conclusion drawn by the author is that errors of feeding and management do tend to be accompanied by an increased colic incidence, but that a high incidence is also encountered when these are beyond reproach. He considers that too much importance has been attached to them in the past. The problem of recurrence was studied in five of the nine groups and its presence accounted for the apparently high colic incidence in some firms: for example, one horse had 31 attacks of colic during the five years under consideration. Of the total number of horses in all groups, 47 per

cent. had colic during the period of observation and, of these, 40 per cent. had at least one recurrence.

In the second paper, the author deals with the problem of colic pain. He considers that the commonest cause of pain is to be found in spasm of the stomach or intestinal wall. In some cases this is due to squeezing or tearing of the wall as in twist or intussusception. Administration of atropine, however, in cases of twist often relieved the pain completely for about 10 to 15 minutes immediately following the injection, which suggests that the pain was due to spasmodic contractions of the intestinal muscle, the result of vagal stimulation rather than of mechanical compression or tearing of the wall at the site of the twist.

Two kinds of intestinal spasm are distinguished—spasmodic peristalsis and tonic intestinal spasm. The distinction is purely clinical since radiographical examination of intestinal movements in the horse is not practicable. The former type of spasm consists in peristalsis, which is increased in amplitude and in frequency and causes considerable pain. Peristaltic sounds become much more intense and usually the faeces are fluid. Displacement of the intestines may occur. The condition can be produced experimentally by the injection of large doses of vagus-stimulating drugs. The second type of spasm consists of a prolonged local increase in tonus of the intestinal muscle of varying extent and duration, resulting in partial or complete obstruction of the lumen: it commonly follows on the first type. Usually it affects the sphincters, *e.g.*, the pyloric, ileal, colic or anal. Detection of this condition during life by rectal palpation is very difficult, except when it affects the rectum or small colon; such examination often causes severe pain. At *post-mortem* examination it is often possible to recognise the abnormally contracted parts, especially if the carcase is opened soon after death. The intestine proximal to the contracted portion will undergo dilatation and later hypertrophy and excellent examples of this are given in the paper, with illustrations. Histological examination of the contracted musculature gives no clue as to the cause of the abnormal contraction.

In the third paper, the pathogenesis of the various types of colic is discussed under the following headings:—

Catarrhal Colic.—Probably the most common type. Often it clears up very rapidly and no veterinary assistance is called in. The condition begins with much-increased peristalsis, giving rise to soft and even watery faeces, since the shorter sojourn of the faecal material in the large intestine allows of less water absorption than normal. Later, tonic spasm of the intestinal muscle sets in and the intestinal contents become very much firmer, though not usually so firm as in typical impaction.

Impaction of the small and large intestine. This is due to tonic spasm of the intestinal muscle, resulting in partial or even complete closure of the lumen. It is more likely to occur if the diet includes much fibrous food, *e.g.*, in winter. (Very few cases are seen in Berne, where much green food is fed throughout the year.) The commonest site for impaction is the large colon (60 per cent.), then the caecum (36 per cent.). The ileum and jejunum are more rarely impacted (3 per cent. and 1 per cent.). During the years of the Great War, when much fibrous material was fed to horses, the frequency of impaction of the small intestine relative to the large intestine rose as shown:—

Years	Small Intestine	Large Intestine
1910-17 ...	17 per cent.	83 per cent.
1917-19 ...	40 per cent.	60 per cent.

Note.—Shortage of foodstuffs during the last years of, and immediately following, the War.

Spasm of the musculature can often be clearly recognised at *post-mortem* examination, and a number of excellent photographs illustrating the condition are given.

Gastric Dilatation and Impaction. — This formed 10 per cent. of the colic cases encountered. Acute cases are considered to be due to spasm of the pyloric sphincter. In several acute cases, animal charcoal was given prior to emergency slaughter and at *post-mortem* examination none was found to have entered the duodenum, the pylorus being firmly closed. Secondary gastric dilatation may occur from such causes as small intestine intussusception or twist.

Idiopathic Ballooning of the Intestines.—Commonest in the small intestine, caecum and large colon; very rare in the small colon. The cause is supposed to be a spastic closure of a portion of intestine and this view is supported by the fact that administration of atropine rapidly causes production of flatus. Fodder containing fermentable material considerably augments the severity of the condition but cannot be considered its primary cause.

Obstruction of the Large Colon by Concretions or Stones.—Such concretions often cause no trouble until they become lodged in the narrow, funnel-like entrance to the small colon. It is considered that abnormally violent spasmodic contractions of the intestinal wall are the chief cause of obstruction by concrements when they are present in such a situation, whereas without such contractions they may cause no disturbance of function.

Displacements of the Intestines.—The origin of this condition is most difficult to explain as no radiographical examination is possible and the method of production cannot be followed by

clinical examination or at *post-mortem* examination. The main types are:—

(1) *Twist.*—Commonest in the small intestine (2·9 per cent. of colic cases) and in the large colon (2·6 per cent.). It is very rare in the caecum and small colon. The explanation frequently given, that the high incidence of twist in the small intestine is due to freedom of movement on the mesentery, is not applicable since the condition is very uncommon in the small colon. The author considers abnormal spasmodic contractions play the main rôle in the aetiology rather than the variety of mechanical factors which many workers have considered as being responsible. There appears no doubt that volvulus occurring during an attack of colic is in many cases due to the administration of drugs such as barium or eserine. The coincidence of cases of volvulus in the Prussian army horses during the years of eserine administration is cited in favour of this view, as also is the practical experience of the author. In one case recorded, it is considered that volvulus was almost certainly due to the injection of Neucesol (a drug having an action similar to eserine).

(2) *Intussusception.*—Probably due to the invagination into a flaccid portion of intestine of a spastically contracted portion.

(3) *Internal Strangulation of Intestine.*—May be through a normal opening, *e.g.*, foramen of Winslow, lieno-renal ligament, or to a dilated inguinal ring, tear in the omentum, pedunculated lipoma, etc. It is considered that spastic contraction of a portion of intestine may cause it to enter a foramen which would normally be too small for it, and that increased peristalsis and intestinal spasm are important factors in producing strangulation.

The general conclusions to be drawn from the three previous papers are given in the fourth article. The disturbances of the function of the intestinal musculature are classified as:—

(1) Increased tonus and rhythm of peristalsis, resulting in so-called nervous, spasmodic, catarrhal or rheumatic colic.

(2) Predominantly increased tonus with suppression of peristalsis causing narrowing or complete closure of gut lumen: results in acute gastric dilatation, impaction or in idiopathic ballooning.

(3) Disturbed peristalsis, resulting in local displacements of the intestines such as twist, intussusception or strangulation.

The second group is the commonest. Previous workers considered atony of the intestinal wall as an important factor, but Gratzl thinks it to play quite a secondary part and considers that spasmodic contractions are the primary factor. The various types of colic are influenced by the nature of the food, but this is for the most part a secondary and not a primary effect.

It is concluded that equine colic does not represent a variety of different conditions having colicky pains as a common clinical feature, but rather represents one and the same disease characterised by spasmodic motor disturbances of the stomach and intestines. By the action of various secondary factors the variety of types of colic are produced, each of which exhibits characteristic colicky pain. Such secondary factors include the bacterial flora in the intestines, nature of food, intestinal secretions, management, work, weather, etc.

The sixth paper deals with the causes of intestinal spasm. Mechanical irritation of the intestinal wall may be the result of stretching, as in gastric dilatation, impaction, etc., or of compression or tearing, as in strangulation or volvulus. Chemical agents may possibly be produced in the intestines by bad food, abnormal bacterial flora, etc. Increased carbon dioxide tension stimulates contractions of the intestinal muscle and has been shown by Marek to cause spasm of the wall in embolic colic and in such conditions as volvulus and intussusception. Although 90 to 94 per cent. of adult horses show verminous aneurysms, only at most 1·8 per cent. suffer from embolic colic.

Experiments were carried out on normal horses and on animals with colic, using a variety of drugs, the actions of which are classified as follows:—

(1) Drugs stimulating the parasympathetic, *e.g.*, pilocarpine, eserine, arecoline, cesol, neucesol, lentin (all stimulating vagal endings).

(2) Drugs paralysing the parasympathetic, *e.g.*, atropine (paralysing vagal endings).

(3) Drugs stimulating the sympathetic, *e.g.*, adrenaline (stimulating sympathetic endings).

Experiments

Group 1.—Three normal horses and four colic cases were given eserine subcutaneously in varying doses. In normal animals it was almost without effect, but the action was pronounced in colic cases, due to the increased irritability of the parasympathetic nerves. It was found in one animal that the action of the drug was most pronounced on that portion of intestine affected with spasm (the caecum).

Group 2.—Atropine has been used for many years in the Vienna clinic, especially in impaction of the large and small intestine, and has been found very valuable, particularly in caecal impaction. In some cases therapeutic doses are unable to relieve the spasm and larger doses have undesirable effects on the central nervous system.

Group 3.—Adrenaline was given to six normal horses and twelve colic cases. In the former it is possible to arrest peristalsis completely, no peristaltic sounds being detected on auscultation. In colic cases the action of the drug is less marked than in the case of atropine and lasts only a short time.

Group 4.—Injection of lentin, adrenaline and atropine was tried on six colic cases. Lentin caused a marked increase of spasm, adrenaline resulted in a relaxation for a short time, and atropine usually completely removed it.

The evidence obtained from these experiments supports the author's view that in colic there exists an excessive stimulation of the parasympathetic nerves to the gut and also an increased susceptibility to certain drugs.

The causes of the hyper-excitation of the parasympathetic nerves which has been considered the cause of colic are discussed in the next paper. Diet has already been considered as merely a secondary factor. Evidence of the increased incidence of colic under unsuitable working conditions—strain and irregular working hours—was provided in the statistics given in the first paper. "Chill" may be the cause and this was shown in Vienna both in regard to animals exposed to external "chill" and when given cold food and water whilst hot. Meteorological conditions have often been considered to affect the incidence of colic and the results of many workers are cited in support of this view; and are in agreement with the author's observations at the Vienna clinic. Horses have been encountered which are very susceptible to weather changes, especially thunderstorms.

During recent years several papers have appeared in which lesions have been described in the mesenteric ganglia and in the nerves related to the anterior mesenteric artery, and there is evidence that in parasitic aneurysm of this vessel there are definite inflammatory and degenerative changes in and around these nerves. It appears possible that such damage might result in a hypersensitivity of the intestinal nerves to stimuli of the various kinds mentioned above. The effect of meteorological changes on such damaged nerves of the vegetative nervous system is also considered a possible cause of acute colic.

The last paper deals with the question of treatment. The author does not advise the use of the drastic drugs of the pilocarpine group, since they increase the vagal tonus, already raised above normal. The use of barium salts and purgatives which directly stimulate the intestinal muscles is also contra-indicated. Rupture or intussusception is a not uncommon sequel, due undoubtedly in many cases to such treatment. Only if there is atony of the gut as detected by the absence of peristaltic sounds should drugs of the pilocarpine group be employed and the most suitable drug appears to be lentin. [Very good results with this drug have been reported in cases of impaction from Germany and from America and the use of this agent in the former country is now almost universal.] The drug on which chief reliance is placed in cases of impaction is atropine. It is not advisable where there is excessive fermentation and tympany, since it diminishes intestinal secretions and also produces polyuria. The ethereal oils act only feebly. Adrenaline is weak in its action and the effect lasts only a short time. The administration of large doses causes undesirable effects such as sweating, irregular and accelerated pulse and muscular tremors There is as yet no drug which can be considered a really reliable treatment for colic.

Hydrotherapy is an exceedingly useful form of treatment, especially the injection into the stomach of cold water. The action is two-fold:—

(1) Removal of gas and fluid and prevention of rupture: it is, however, by no means possible to remove all the solid contents of the stomach in this way.

(2) Reflex stimulation of intestinal peristalsis.

It is the custom at the clinic to follow gastric lavage with the administration of three quarts of a concentrated solution of Glauber's salts in order to soften the stomach contents remaining and to aid in emptying the intestine, as well as to minimise the absorption of toxic products formed in the intestine under the abnormal conditions of intestinal function.

[Among the 48 references provided there is not a single one to any work published in English. It is felt that an abstract of this series of articles may be of some service to practitioners who encounter cases of equine colic and who may perhaps be able to examine the correctness or otherwise of these conclusions by clinical observation, treatment and by *post-mortem* examinations whenever the opportunity arises. If their findings are recorded there will undoubtedly result much useful information on a subject of great importance and about which there is a lamentable paucity of published records in this country during recent years.]

E. G. W.

* * * * *

[**Tetanus in the Dog.** Liegeois, F. (1936.) *Ann. Méd vét.* **81.** 5. 193-198.]

The author describes three cases of tetanus in the dog and in doing so points out that such cases are not rare, as is generally supposed.

Two of the cases developed simultaneously in dogs in hospital, both of which had open wounds in the vulva and vagina. Infection was ascribed to straw litter. The third case was diagnosed in a dog brought for treatment.

Discussing the disease, the author points out that in the dog the symptoms are first localised to the head and that dogs showing approximation of the ears, and a peculiar wrinkling of the skin of the front of the body should be regarded as suspicious, particularly if the dog

has some wound which could be infected by litter or soil. Treatment should consist of daily injections of serum and he also advises occasional chloroforming and injections of urotropine, the reasons for which he gives.

G. D.

* * * * *

[The Pathology of Crotalaria spectabilis (Roth Seed) Poisoning in the Domestic Fowl. Emmel, M. W. (1937.) *J. Amer. Vet. Med. Ass.* **90.** 5. pp. 627-634. (1 table, 1 fig., 1 ref.)]

The author records the experimental data obtained from 19 birds which were force fed on *C. spectabilis* seed. Two types of poisoning occurred, acute and chronic, of which the symptoms, gross lesions, histopathology and the blood picture are fully described.

In the acute type of poisoning the outstanding lesions are petechiae in the serous membranes and visceral fat and particularly in the myocardium and coronary fat; and a dark marbled liver. In the chronic type of poisoning necrotic enteritis, ascites and anaemia are seen; the liver often appears as in the acute type.

The dominant features of the histopathology are passive congestion, oedema, cloudy swelling, and occasionally foci of necrosis in the parenchymatous tissues, smooth muscle and serous membranes.

Tables are given showing the total and differential blood counts of the birds under experiment.

R. F. G.

* * * * *

[The Treatment of Piroplasmosis (P. bigeminum) with Akiron. Legg, J. (1936.) *Austral. Vet. J.* **12.** 6. 227-230.]

This article records that in three splenectomised calves, experimentally infected with *Piroplasma bigeminum*, treatment with akiron (acaprin), in doses of 4 to 5 c.c. given intravenously, resulted in complete disappearance of the parasites, loss of infectivity of the blood, and no immunity to subsequent reinfection. It appears that treatment with this dose of the drug may prevent the development of "premunity."

U. F. R.

Moray and Nairn Diseases of Animals Committee has decided to co-operate with the Diseases of Animals Committee of Aberdeen County Council in the efforts to combat the sheep tick plague, which has wrought serious damage among flocks in Aberdeenshire and Kincardineshire.

REPORTS

Glamorgan County Council

REPORTS OF THE CHIEF VETERINARY OFFICER, 1936-37

The reports of Mr. J. Howard Jones, Chief County Veterinary Officer, summarising the work carried out for the Glamorgan Agricultural Committee, are issued quarterly, and we are in receipt of four reports dated respectively November, 1936, February, May and August, 1937.

The chief portion of these reports consists of tables giving particulars of cattle slaughtered under the Tuberculosis Order of 1925. These are given in great detail, including the name and address of each owner, the kind of animal, the agreed market value, the compensation paid, the results of *post-mortem* examinations, the salvage received, and so on. It is to be noted that the salvage received is the same for all the 320 cattle slaughtered, namely 12s. per carcase, which indicates that all carcases were dealt with by knackers, no matter whether the value was £1 10s. or £25, which appear to be the lowest and the highest values agreed upon. It certainly seems unfortunate that none of the carcases was able to be passed fit for human consumption. Judging by the values given in the report, many animals must have been in good condition and in many cases their carcases must have been fit for sale as meat. It would thus appear that a considerable quantity of perfectly sound meat has been lost to the public and a by no means negligible sum of money to the ratepayers.

We note that during the four quarters under review 320 cattle were slaughtered under the Tuberculosis Order. This number compares very closely with 326 cattle slaughtered during the calendar year 1936. Of these tuberculous cattle, 72 were suffering from tuberculosis of the udder, 117 were found either on routine dairy inspection or while investigating complaints of tubercle bacilli being found in a bulk supply of milk, 189 were reported by their owners and 14 by veterinary practitioners. One hundred and twenty-nine, or 40·3 per cent., were found to be "advanced" when killed and 191, or 59·7 per cent., "not advanced." An interesting feature of the report and one which is not usually given, is information as to the origin of each animal dealt with, whether home-bred or, if purchased, where it came from.

While carrying out the routine veterinary examination of dairy herds, 2,770 visits were paid by the veterinary staff to farms, and 632 specimens of milk, sputum, blood or other

material were examined microscopically by the veterinary staff.

Referring to other diseases, Mr. Jones informs us that there were no cases of foot-and-mouth disease, although one suspected outbreak was investigated and found to be negative.

Six carcases were examined for anthrax, but only one was found to be affected with the disease. Two horses were examined for parasitic mange, with negative results.

The county veterinary staff consists of Mr. Jones (the Chief) and two assistant veterinary officers, who are responsible for the various duties of the Diseases of Animals and the Milk and Dairies Acts and Orders.

* * * * *

West Sussex County Council

ANNUAL REPORT OF THE CHIEF VETERINARY OFFICER

Dr. L. Jordan, Chief Veterinary Officer, has recently issued his annual report on the work carried out by his veterinary staff during the year ended March 31st, 1937. The staff includes four whole-time assistant veterinary officers, who are all stationed in Chichester but allotted certain districts in which to work, and five part-time veterinary officers.

The incidence of anthrax in the county is low, there being three confirmed cases compared to two last year, the imposition of the Diseases of Animals (West Sussex) Order, which came into force on June 2nd, 1936, not revealing any marked increase of the disease.

There was one case of foot-and-mouth disease, which was an isolated case of unknown origin. There were no outbreaks of sheep scab but one of parasitic mange. Swine fever has not been very prevalent, there being 13 cases involving 103 affected animals.

The report points out that the institution of regular routine inspections of dairy herds in the county has reduced the number of advanced cases of bovine tuberculosis. There were 291 animals slaughtered under the Tuberculosis Order, of which 48 per cent. (140) were advanced and 52 per cent. (151) not advanced. The average rate of valuation and compensation has increased to £7 17s. 7d. and £4 7s. 11d. respectively. One hundred and forty-five of the condemned animals were reported and 157 found on routine inspections, one animal dying before slaughter. Of the 162 animals reported as suspected but not confirmed 69 were found to be suffering from Johne's disease.

From enquiries made it was found that 55 of the affected animals were home-bred, 125 bought in, and 112 of unrecorded origin.

Observations made revealed that 77 per cent. of the owners of milking herds were more or less complying with the provisions of the Warble-fly (Dressing of Cattle) Order of 1936.

There were 54 tuberculin-tested herds in the county, an increase of 26 during the year—a very favourable comparison with other counties, no less than 4·7 per cent. of the registered herds in the county being tuberculin tested as against 1·1 per cent. for England and Wales.

The procedure under which premises are examined with the view to granting Accredited licences is given, the local sanitary inspector and the veterinary officer working in collaboration. Check samples are taken by the County Agricultural Advisory staff.

There were 349 Accredited licensees, an increase of 44 during the year. A table is given showing that 30·2 per cent. of the milk producers are Accredited.

The county has five Attested herds.

There were ten reports received under the Milk and Dairies (Consolidation) Act notifying the presence of tubercle bacilli in milk. In eight instances tuberculous cows were slaughtered, but in two cases no tuberculous animals were found.

During the inspections of 25,682 cows in the county contained in 1,155 herds, 1,468, or 5·7 per cent., were found to have abnormal udders. One hundred and fourteen of the herds were machine milked, the remaining 1,041 herds being milked by hand. Figures are also given showing that 45·36 per cent. of the herds are self-contained, 16·2 per cent. buy only, and 38·44 per cent. buy in and also breed.

Of the 893 milk samples submitted to microscopical examination for tubercle bacilli, 38 (4·2 per cent.) were positive, and of the 131 samples biologically tested, 20 (14·5 per cent.) were positive. Sixty-three, or 33·3 per cent., of the 189 sputa samples were also positive.

Under the West Sussex tuberculosis eradication scheme, Accredited farmers may have their herds tuberculin tested at a total cost of £1 per herd, to cover cost of tuberculin, by whole-time staff until they are clear of the disease. The uncertainty of the Milk Marketing Board's future policy and their decision not to cancel certain contracts halted the rapid progress of the scheme, although six new tuberculin-tested herds were added to the register as a result of the inducement offered.

The report contains much interesting information in the form of tables, particularly with regard to the results of the milk samples submitted to the plate method and methylene blue reduction test to ascertain the bacterial content.

N.V.M.A. DIVISIONAL REPORT

Royal Counties V.M.A.*

SUMMER MEETING AT ABINGDON

The Summer Meeting of the Royal Counties Veterinary Medical Association was held at Abingdon on Friday, July 23rd, 1937, when members and their ladies spent a very enjoyable afternoon as the guests of the President, Colonel G. K. Walker, and Mrs. Walker. The attendance was larger than it has been at this meeting for several years, a fact which must have been very gratifying to Colonel and Mrs. Walker, because the weather in the morning had been cold and wet and calculated to deter many members who had to come long distances; nevertheless, 45 members and their ladies accepted the President's invitation and arrived at Abingdon, where their intrepidity was rewarded by dry weather and sunshine in which to enjoy the hospitality which awaited them there.

Business Meeting

The proceedings commenced with a short business meeting at the Abbey House. Colonel Walker occupied the chair. The following members apologised for inability to attend: Mr. J. Bell, Captain R. E. C. Bullen, Major G. W. Dunkin, Lieut.-Colonel H. Greenfield, Captain J. R. Hewer, Major W. H. Kirk, Messrs. T. W. Lepper, J. McKerlie, E. S. Paterson, Veterinary Lieut.-Colonel G. B. C. Rees-Mogg, Mr. H. C. Shingler, Lieut.-Colonel P. W. Dayer-Smith, Mr. R. A. Willett and Professor G. H. Wooldridge.

The minutes of the April meeting, having been published in the *Veterinary Record*, were taken as read and signed accordingly.

Colonel Walker offered the congratulations of the Association to Lieut.-Colonel Simpson on his election to the Presidential Chair of the Royal College, and wished him a successful year of office.

Colonel Simpson thanked Colonel Walker for his kindly reference to the honour which had been conferred upon him, but begged to be excused from making a speech, as everyone in the room was anxious to be on the river.

Resolutions.—The Hon. Secretary read two resolutions which had been passed at an Extraordinary General Meeting of the Association held in Reading on July 9th, 1937. This meeting had been called to discuss the Tuberculosis (Attested Herds) Scheme, 1937, of the Ministry of Agriculture and Fisheries, as it affected the general practitioner, also fees for tuberculin testing.

The resolutions were:—

(1) "That we, the members of the R.C.V.M.A., welcome the Ministry of Agriculture and Fisheries Tuberculosis (Attested Herd) Scheme, 1937, and give it hearty support."

A copy of this resolution had been sent to the Ministry of Agriculture and also to the Chief Veterinary Inspector of the Ministry.

The Hon. Secretary then read a letter which he had received from the Chief Veterinary Inspector, in which he expressed the Ministry's gratification at receiving this promise of co-operation on the part of the Association, because the Ministry recognised that the success of the scheme would be largely influenced by the attitude of the veterinary profession.

(2) "We, the members of the R.C.V.M.A., in supporting the Attested Herd Scheme of 1937, approve the scale of fees laid down for remuneration of veterinary practitioners by the Ministry of Agriculture and are agreed that it is a fair scale of minimum fees to be charged for the testing of commercial herds."

A copy of this resolution was sent to the National Association with the suggestion that the Divisions of the "National" be asked to support it, in order to produce a highly desirable state of unanimity.

The Hon. Secretary had received an acknowledgement of the receipt of this resolution from the General Secretary of the National Association.

Nominations and Elections.—Major J. Bell, of Maidenhead (proposer, Lieut.-Colonel P. J. Simpson; seconder, Major F. J. Taylor), and Veterinary Lieut.-Colonel B. R. Body, 2nd Life Guards (proposer, Mr. J. Willett; seconder, Mr. G. P. Male). Mr. K. N. Scott, a former member, was unanimously re-elected to membership.

The following were unanimously elected to membership: Mr. J. A. De Garis, M.R.C.V.S.; Dr. T. Hare, Ch.B., B.V.Sc., M.R.C.V.S.; Mr. J. Pickup, M.R.C.V.S.; Mr. L. Pitcher, M.R.C.V.S.; Mr. T. W. Stobo, M.R.C.V.S.; and Mr. T. J. Tyrrell, M.R.C.V.S.

Mr. W. E. Beckett had withdrawn his name for election because, since the previous meeting, he had left the district.

Place of Next Meeting.—It was decided to hold the November meeting in London.

Any Other Business.—Under this heading the Hon. Secretary read a letter from Messrs. T. J. Smith and Nephew, of Hull, in which the firm expressed its willingness to show a film dealing with bone fractures in the dog and cat, for the benefit of the Association. It was decided to

*Received for publication September 17th, 1937.

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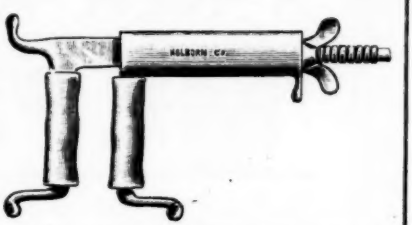

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accept the offer, on the proposition of Mr. G. P. Male, seconded by Major Hancock.

The Hon. Secretary was instructed to arrange for the film to be shown at the November meeting in London. The Secretary was also instructed to invite Professor Wright to be present and deliver a short paper in conjunction with the showing of the film.

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At the conclusion of the meeting the members and ladies repaired to the Guildhall, where they were welcomed by the Mayor of Abingdon. After an inspection of the famous pictures and plate the party set out in a launch for an outing on the river. Tea was provided by Colonel and Mrs. Walker at Sandford Lock. After tea Lieut.-Colonel P. J. Simpson proposed a very hearty vote of thanks to Colonel and Mrs. Walker for their hospitality that afternoon, which everybody had enjoyed to the full. The Colonel made allusion to the successful meetings which had been held under the presidency of Colonel Walker, referring particularly to the dinner at Reading. Colonel and Mrs. Walker in turn replied and expressed their appreciation of the number of members and their ladies who had come to Abingdon, declaring that, if their guests had enjoyed themselves, they were happy.

The party then returned to Abingdon by launch.

The following members and visitors were present: Colonel and Mrs. G. K. Walker, Mr. N. S. Barron, Mr. and Mrs. J. Baxter, Miss Rita Belgonzi, Mr. and Mrs. H. Bell and Mrs. Bell, Dr. and Mrs. Bullock and Mr. Bullock, Mr. S. Carke, Mr. and Mrs. B. G. Catmur, Captain and Mrs. H. B. Collet, Mr. and Mrs. R. M. Davidson, Major A. C. Duncan, Mr. H. Gooch, Major and Mrs. R. C. G. Hancock, Mr. and Mrs. E. J. Heather, Sir Frederick Hobday, Mr. J. McIntosh and Mrs. Nickinson, Mr. and Mrs. G. P. Male, Mrs. R. M. Rowen, Lieut.-Colonel and Mrs. P. J. Simpson, Mr. T. W. Stobo, Major F. J. Taylor, Mr. E. M. Thompson, Captain and Mrs. W. K. Townson, Mr. and Mrs. F. W. Willett and Miss Willett, Mr. J. Willett and Mrs. Barratt Stennett.

H. Bell, *Hon. Secretary.*

In preparation for the extension of the Royal (Dick) Veterinary College, Edinburgh, the demolition of old buildings in the vicinity of the College has been begun. The cost of the extension is approximately £40,000, and State assistance to the extent of £20,000 having been promised, a similar sum has to be raised from other sources. A list of veterinary subscribers has appeared in our columns recently.

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Oct. 25th.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 4 p.m.

Oct. 27th.—Meeting of the Western Counties Division, N.V.M.A., at Taunton.

Oct. 28th.—Meeting of the South-Eastern Division, N.V.M.A., at Maidstone, 3 p.m.

Oct. 29th.—Yorkshire Division, N.V.M.A., Annual General Meeting at the Hotel Metropole, Leeds, 3 p.m.

Nov. 3rd.—Meeting of the Lancashire Division, N.V.M.A.

Nov. 9th.—**Royal Veterinary College: Opening of new buildings at Camden Town by His Majesty King George VI.**

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N.V.M.A. Congress, 1938.

The Provisional Committee for the 1938 Congress of the Association, which, as previously announced, will be held in Glasgow, met at the Central Station Hotel, Glasgow, on Tuesday, October 12th. The committee appointed Captain W. Watt, M.R.C.V.S., D.V.S.M., as its Chairman, and Mr. Alex Thomson, M.R.C.V.S., agreed to act as Local Honorary Secretary.

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PERSONAL

Forthcoming Marriage.—The engagement is announced between Kenneth Guy Douglas Evans, M.R.C.V.S., only son of Percival Douglas Evans, late of Newmarket, and of Mrs. Moncrieff, of Wych Hill, Woking, Surrey, to Olive Winifred, only daughter of Mr. and Mrs. P. H. Rocks, of Hatchlands, Addlestone, Surrey.

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On Leave.—The following officers of the Colonial Veterinary Service arrived home on leave during the month of September: Messrs. N. Burke and R. W. Sainsbury (Nigeria), W. E. Lancaster (Federated Malay States).

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Promotions.—The following promotions in the Colonial Veterinary Service are announced: Mr. M. Crawford, M.R.C.V.S. (Government Veterinary Surgeon) to be Deputy Director (Animal Husbandry) and Government Veterinary Surgeon, Department of Agriculture, Ceylon; Mr. G. B. Simmins, M.R.C.V.S. (Veterinary Research Officer) to be Senior Veterinary Research Officer, Department of Agriculture and Fisheries, Palestine.

* * * * *

Will.—Mr. William White Norwood, M.R.C.V.S., of High Street, Conisborough, veterinary surgeon, left £4,203 (net personalty £2,577).

R.C.V.S. OBITUARY

Jones, Hugh Shelton, Pwllheli, Carnarvon. Graduated London, July 16th, 1896. Died September 29th, 1937; aged 71 years.

McGregor, George O., 18, Queen's Terrace, Ayr. Graduated Glasgow, July 15th, 1884. Died October 5th, 1937; aged 76 years.

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DR. EURICH'S RESEARCH IN ANTHRAX

The Textile Institute has decided to award the Institute Medal to Dr. F. W. Eurich, of Bradford, for his valuable service to the wool industry through anthrax research. The Institute's medal is awarded generally for services rendered to the Textile Institute itself, but the work of Dr. Eurich is considered to have been so important to the textile industry that this award has been made.

In a statement the Textile Institute record that Dr. Eurich was appointed bacteriologist when, in 1905, the Home Office, in co-operation with the Bradford Chamber of Commerce, constituted the Anthrax Investigation Board. Cases of anthrax were then alarmingly frequent and fatal. By securing the necessary knowledge, by disclosing sound preventive measures and by introducing improved treatment of the disease when contracted, Dr. Eurich effectively reduced both the incidence and fatality of the disease.

The investigation involved the bacteriological examination of about 14,000 samples of wool and hair, the virulent nature of the anthrax bacillus being a constant and serious danger to the investigator. He was the first to cultivate anthrax organisms from the wool and found that, contrary to expectation, wools might be as dangerous when clean as when dirty. He discovered that many varieties of wool and hair, some of which hitherto had been considered to be free from danger, were liable to infection. The nature of the anthrax bacillus, the mode of infection and the conditions under which it persisted, were discovered. Openers and sorters were taught to identify dangerous material.

With Mr. Elmhurst Duckering, Dr. Eurich succeeded in killing anthrax spores and bacilli in a wool sample with formaldehyde, and this was found to have no deleterious effect on such processes as spinning and dyeing. His work not only made perfect safety a practicable ideal, but had effectively reduced the incidence of the disease. As the result of his work the fear of "Bradford Disease" was now practically non-existent.

Dr. Eurich was entertained by members of the medical profession and of the wool textile industry in Bradford on September 29th at a farewell dinner before his departure south, where he is retiring.

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LEGAL NOTES

Alleged Misrepresentation in Sale of a Puppy.—At Londonderry Recorder's Court, recently, Kathleen, Duchess of Laurino, was awarded 25 guineas (the price of a Pekingese puppy in connection with the sale of which she alleged misrepresentation), £11 veterinary surgeon's fees and £15 witnesses' expenses, in an action against Mrs. Vida Shannon, wife of William Shannon, a well-known Londonderry magistrate and huntsman.

Mr. C. A. Nicholson, for the Duchess, said she bought the pup from Mrs. Shannon in response to an advertisement. When it arrived in Cornwall she found it suffering from rickets. It had a curved spine, a bad coat, and was suffering from sarcoptic mange. The Duchess, he said, was asked to pay an extravagant price for a show specimen. Instead of a show specimen "she got that creature." When she received the dog the Duchess sent a wire to Mrs. Shannon asking for the return of her money. This Mrs. Shannon refused to do.

The Duchess, in evidence, said that the puppy looked more like a bulldog than a Pekingese. She had it isolated and destroyed.

Mr. William Richardson, M.R.C.V.S., Wadebridge, Cornwall, and Mr. F. T. Harvey, F.R.C.V.S., St. Columb, Cornwall, said the dog was suffering from mange and rickets.

For the defence Mrs. Shannon said the dog had lived with other dogs at Coshquin Kennels, and if it had disease these would have been infected. She refused to take the dog back because the dog described by the Duchess was not the one she had sold.

William Shannon, husband of the defendant, said there had never been any trouble with mange among the dogs in the Coshquin kennels.

His Honour Judge Osborne, K.C., held that on the evidence of Mr. Richardson and Mr. Harvey the dog was not healthy when it left Londonderry.

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TAXATION AND LICENSING OF VETERINARY SURGEONS' CARS

Legal Aspect of "Goods Vehicle Conversion"

For the information of our readers we reproduce below **(A)** the text of a communication of enquiry relative to the above recently received from a member, and **(B)** that of the detailed reply thereto courteously furnished, after reference to their Legal Department, by the Automobile Association, to whom the questions at issue were submitted.

(A) My car is a saloon 30 h.p. Ford V8, tax £22 10s. 0d. annually and is registered and insured and licensed for private and professional use.

The back seat and panel are loosened and can be removed for easier conveyance of cat and dog crates, medicine, instruments, etc., for professional use. The seats are generally left at home when I am visiting.

(1) Does removal of seats convert the car into a "goods" or "trade" vehicle?

(2) Does fitting a platform over rear footwells to make a level surface also constitute conversion into a "goods" vehicle, even when seats are in position?

(3) Are professional articles or animals "goods" under the Traffic Acts?

(4) Should the local authority be notified of alterations.

(5) What restrictions are in force for altered car?

(6) Is speed limited to 30 m.p.h. everywhere?

(7) Should a log book be kept?

(8) Is driving time limited per day?

(9) Should an extra licence be taken out; if so, which?

(10) Should any extra licence be taken out for cars of lower horse-power and tax?

(11) What are the penalties for any "crimes" I may be committing at present?

(12) What other information have you on this subject?

. . . . .

(B) From the standpoint of taxation, if the ordinary private car is adapted so as to fit it for the conveyance of goods or burden—whether for business purposes or otherwise is immaterial

—then the appropriate basis of taxation would be upon unladen weight as for a commercial vehicle but only, of course, if this be in excess of what would be chargeable upon horse-power in respect of the occasions when the car is reconverted for private use.

Further, vehicles which are constructed or adapted for use for the conveyance of goods or burden of any description and so used for or in connection with any trade or business are, under the provisions of the Road and Rail Traffic Act, required to be licensed as carriers' vehicles.

In the above connections our legal advisers are of the view:—

(1) That the mere removal of the cushion on the back seat would not amount to an adaptation within the meaning of the Statute, but it would be otherwise in the case of more extensive alterations such as the displacement of the back seat and panel.

(2) It is not considered that a platform placed over the footwells would of itself amount to conversion.

(3) All professional articles and animals are undoubtedly within the term "burden" but the primary factor is whether or not the vehicle is constructed or adapted to carry the same.

(4) If it affects the registered particulars of the car the answer is in the affirmative.

(5) See replies to 6 and 7.

(6) The maximum prescribed limit of speed for goods vehicles is 30 m.p.h.

(7) The grant of the carrier's licence is subject to records being kept unless the Authority dispenses with this requirement.

(8) The answer is in the affirmative. Explanatory leaflets are obtainable from the Licensing Authority.

(9) and (10) See above.

(11) Generally speaking, the maximum for a first is £20.

(12) The insurance effected must permit of the car being used in the manner indicated.

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H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office, at the following addresses: London: Adastral House, Kingsway, W.C.2, and 28, Abingdon Street, S.W.1; Cardiff: 1, St. Andrew's Crescent; Manchester: York Street; Edinburgh: 120, George Street.

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STATUTORY RULES AND ORDERS, 1937:—				
860. Animal. Diseases of Animals. The Exportation and Transit of Horses, Asses and Mules (Amendment) Order, dated September 21st, 1937.	0	1	0	1½
WAR OFFICE:—				
Cavalry Training (Horsed). July, 1937. (57-33-0-37). ...	2	0	2	3

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MEAT IMPORTS INTO SCOTLAND

The Department of Health for Scotland have now recognised under the Public Health (Imported Food) Regulations (Scotland), 1937, official certificates for 20 countries to accompany imports of meat and meat products into Scotland. The recognition of a certificate implies (*a*) that the meat to which it relates or the meat from which the meat product to which it relates was prepared was derived from animals inspected *ante-* and *post-mortem* and passed in accordance with criteria satisfactory to the Department; and (*b*) that all necessary precautions for the prevention of danger to public health were taken in the dressing or preparing and packing of the meat or meat product.

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ANIMAL LIFE ON "SHIVA'S TEMPLE"

Dr. Harold Anthony, leader of the Patterson-American Museum expedition which explored Shiva's Temple, the isolated plateau surmounting 1,100 feet of sheer rock which springs from the floor of the Grand Canyon, on his return to New York gave some account of the results of his exploration.

The object of the expedition was to study animal life on the wooded plateau in order to discover whether isolation produced any marked changes in appearance and habits of creatures and in the hope of gaining useful knowledge of the effects of inbreeding and evolution in general. During his stay on the plateau from September 15th to 26th, Dr. Anthony shot or trapped some 75 specimens, which have been skinned and will be forwarded to New York for examination. The animals found on the Temple, all of which were extremely wild and nervous of man, were chipmunks, three or four species of mice, which were very numerous, cottontail rabbits, rock squirrels, which resemble the common grey squirrel, and pack rats, of which one species may be peculiar to Shiva.

Dr. Anthony expressed the belief that the colour of all these animals was lighter than their fellows on the north and south rims of the Canyon, which are respectively one-and-a-half and eight miles in direct line from Shiva, but this remains to be proved by careful comparison. In addition, the plateau is visited in winter by deer and by cougar or mountain lion and coyote.

The vegetation, consisting of pines, juniper, shubs, and cactus, is more arid than on the mainland, and the heat on the Temple, which is entirely waterless, is considerably greater than on either side of the Canyon. Many Indian remains were found in the shape of mounds, ovens and tools, but members of the expedition were the first men to undertake the scientific study of the plateau, of which the area is about 300 acres.

While no positive results can yet be announced, Dr. Anthony believes that it will be possible as the result of the expedition to reach an approximately accurate date for the separation of Shiva from the main land, and hopes that at least one distinct species of animal may be discovered to exist there.—*The Times.*

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NATIONAL PONY SOCIETY

Mr. Roy B. Charlton (President) announced at the Council meeting of the National Pony Society, held on the 8th inst., that the Society's next show will be held at the Royal Agricultural Hall, London, N., on Friday, March 4th, and Saturday, March 5th, 1938. The schedule of classes was drafted and the following agreed to:—

Polo Young Stock.—Seven classes.

Polo Breeding Classes.—One class each for stallions and brood mares as against two each

at the 1937 Show. Prize money in each class to be increased to £15, £8, £5 and £3. The usual two produce classes will also be provided.

Polo Riding Classes.—Seven classes for ridden ponies, with one hack class for polo-bred ponies to be ridden by ladies side-saddle.

Mountain and Moorland Ponies.—In view of the success of the classes for these at the 1937 Show, the Council decided to renew them for 1938. These are for Dales, Fell and Highland ponies, and a special challenge cup (in memory of the late J. H. Munro-Mackenzie—the well-known authority on Highland ponies) will be offered by Miss Norah Mackenzie for the best mare likely to produce a pony of its own breed. There will also be riding classes for Exmoor, Dartmoor, New Forest and Welsh ponies. In addition, there will be breeding classes for Welsh mountain ponies, Shetlands (including two novel classes for miniature specimens of this breed), three children's riding classes and two for children's equitation tests.

Arab Horses.—There will also be the usual comprehensive and attractive classes for Arab horses arranged by the Society for that breed.

The usual attractive schedule of competition classes will again be provided on both afternoons of the Show.

Mr. R. C. Irving, F.R.C.V.S., was re-appointed Honorary Official Measurer, while judges for the various classes were selected.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The views expressed in letters addressed to the Editor represent the personal view of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

INTRATRACHEAL INJECTIONS OF OIL OF CHENOPODIUM IN "PARASITIC HOOSE."

To the Editor of the Veterinary Record

Sir,—I am indebted to Mr. J. W. Pollock for his observations on the above subject in your issue of the 9th inst. I cannot agree, however, that the deaths in question were the result of injecting an excessive concentration of olive oil into the trachea, with a resulting blockage of the smaller bronchioles. On frequent occasions I have injected a greater amount, minus the chenopodium, without any ill effect.

Neither do I consider it rational to compare the intentional introduction of about 30 minims of sterile olive oil into the trachea with the accidental introduction of anything up to a pint of contaminated linseed oil, into the same passage.

My deduction in the cases recorded in my paper on "Parasitic Hoose," at Bournemouth, was that the *efficacy* of the oil of chenopodium in killing the masses of worms present in a particularly heavy infestation was the cause of death. The complete blocking of the air passages by masses of *dead* worms lent weight to this theory, particularly as the *post-mortem* examinations were conducted immediately after each death.

I can only conclude that Mr. Pollock is favourably situated in being able to treat his cases at an early stage of the disease, before the infestation has become particularly heavy.

It would be of considerable interest if Mr. Pollock would put on record his experience of chenopodium treatment in any advanced cases in which he may have used it. The reports of any *post-mortem* examinations conducted after such treatment, particularly with reference to the effect of the agent upon the vitality of the parasites, would be particularly valuable.

Yours faithfully,
R. H. Smythe.

Vean House,
Camborne.
October 9th, 1937.

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THE USE OF CHLORAL IN THE HORSE

To the Editor of the Veterinary Record

Sir,—Mr. Townsend, in a letter in your issue of October 9th, asks for the experience of other veterinary surgeons in the use of chloral in the horse. I have used it in a great number of cases similar to those indicated by Mr. Townsend. I consider it is especially useful if one has to cast a "fit" horse, *e.g.*, a racehorse in training. A dose of two to two-and-a-half ounces is given in about a gallon of lukewarm water *per* stomach tube, after a 24-hour fast. The horse is brought to the field *at once* and the chloroform muzzle applied. After a wait of about 15 minutes, if the animal does not fall, a small amount of chloroform puts him down very quietly. I have never found any ill-effects from the use of chloral such as those indicated by Mr. Chambers.

Yours truly,
E. V. Kelly.

Kells,
Co. Meath.
October 9th, 1937.

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"NAVICULAR DISEASE"

To the Editor of the Veterinary Record

Sir,—A clinical case of navicular disease was confirmed by radiographs. The animal was then thyroidectomised and an enlarged benign cystic thyroid removed; the intention was to seek and remove any diseased parathyroid, but they could not be located. Six months later the animal is clinically sound, *although the radiographic picture remains unaltered, i.e.*, the disease does not appear to have advanced nor does resolution appear to have commenced.

I forward this preliminary note in the hope that some independent observer may repeat this experiment. I hope to publish a full history of the case, properly authenticated, in the near future.

Yours faithfully,
V. Berwyn Jones.

Guildford.

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STATE DEPARTMENTS AND THE FUNCTIONS OF LOCAL AUTHORITIES

To the Editor of the Veterinary Record

Sir,—The extract given from Mr. H. L. F. Fraser's paper on the above matter is very clearly put and enlightening. It seems to a certain extent to show what little say the veterinary profession has in working out its own destiny—the job always seems to be done for us by those with small knowledge of our desires and requirements.

A recent book by T. S. Simey, Lecturer in Public Administration in the University of Liverpool, entitled, "Principles of Social Administration," is well worth reading at the present time.

Yours sincerely,
G. Mayall.

Bolton.